A 53-year-old man with very frequent ventricular ectopic activity (39.4% burden) and a structurally normal heart was admitted for percutaneous ablation. Electrocardiography showed a bigeminal unifocal ventricular ectopic pattern, with a right bundle branch block configuration and superior axis, indicating likely origin at the inferior left ventricle.

During mapping at the inferior left ventricle, multiple sites with good morphological match to the ectopic beats during pace mapping, and with early local electrograms relative to the QRS complex, were identified. Despite this, the proximal electrograms at these sites consistently preceded the distal bipolar electrograms (Figure 1A) with the mapping catheter oriented perpendicularly to the inferior left ventricular wall (Figures 1B and 1C). Figure 1D shows the good pace maps obtained from these sites. The locations of these sites were roughly in a circle (Figure 1B), presumed to represent sites encircling the posteromedial papillary muscle, with the origin of the ectopic activity at the mid-papillary muscle, which would account for the consistent finding of proximal electrograms preceding distal electrograms at the surrounding sites.

At the final site of successful ablation at the mid-papillary muscle, distal electrograms preceded proximal electrograms during activation mapping (Figure 2A), unlike at sites surrounding the papillary muscle. On the intracardiac echocardiogram (Figure 2B), the ablation catheter tip can be seen to maintain constant contact with the mid-papillary muscle. Following ablation, the patient was rendered free from ventricular ectopic activity, confirmed with ambulatory electrocardiographic monitoring at 4 months post-ablation.

Ventricular ectopic beats arising from endocavitary structures such as papillary muscles, moderator bands, and false tendons are thought to account for 10% of ventricular ectopic beats (1–3). The twin findings of proximal electrograms consistently preceding distal electrograms, found in a wide circular area with good pace maps, should always prompt the operator to search for an endocavitary origin of ectopic activity, with the exit site located distant from the ventricular wall, accounting for the proximal-to-distal direction of activation.
FIGURE 1  Mapping of Ectopic Activity at the Inferior Left Ventricle

(A) Intracardiac electrograms recorded from the mapping catheter (unipolar electrogram from distal electrode, distal bipolar electrogram, and proximal bipolar electrogram) from 6 sites at the inferior left ventricle and the corresponding surface electrocardiograms, during ventricular ectopic activity. Red and yellow closed circles denote local activation times for unipolar and bipolar electrograms, respectively. Despite good pace matches and early local signals relative to QRS onset, the proximal bipolar electrograms were consistently ahead in timing relative to the distal bipolar electrogram. (B) The locations of the 6 sites are shown on the inferior view of the left ventricle and are located roughly in a circle, centered on the posteromedial papillary muscle (X). (C) Recordings from all 6 sites were with the catheter perpendicular to the inferior wall, as shown in the 2 representative examples. (D) Pace mapping at all 6 sites generated good 12-lead electrocardiographic morphological matches to the ventricular ectopic beats, as shown in 2 representative examples (paced beats in yellow, ectopic beats in green).
REFERENCES


KEY WORDS
intracardiac echocardiogram, mapping, ventricular ectopic, ventricular tachycardia